UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 10/743,944 | 12/24/2003 | Mamoru Miyachi | 107156-00220 | 9574 |

7590 11/28/2005

ARENT FOX KINTNER PLOTKIN & KAHN, PLLC
Suite 600
1050 Connecticut Avenue, N.W.
Washington, DC 20036-5339

| EXAMINER | |
|---|---|
| UNELUS, ERNEST | |
| **ART UNIT** | **PAPER NUMBER** |
| 2828 | |

DATE MAILED: 11/28/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

AK

| Office Action Summary | Application No. | Applicant(s) |
|---|---|---|
| | 10/743,944 | MIYACHI ET AL. |
| | Examiner | Art Unit |
| | Ernest Unelus | 2828 |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on 25 November 2002.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) 1-23 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-23 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 24 December 2003 is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date 01/11/05, 12/24/03.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1, 5, 6, 15-18, and 21 are rejected under 35 U.S.C. 103(a) as being anpatentable over Floyd (US pat. 6,282,220) in view of Tan et al (US pat. 6,252,896.

With respect to claim 1, Floyd discloses a semiconductor laser device for emitting a plurality of laser beams having different wavelengths, said device comprising: first laser oscillation section (200) formed on a semiconductor substrate (see fig. 4) and having a predetermined specific area (see figures 3 and 4); and a second laser oscillation section (140) having a smaller specific area than the first laser oscillation section (see figures 3 and 4), wherein the first laser oscillation section's one surface located away from the semiconductor substrate and the second laser oscillation section's one surface located close to its light emitting portion having an electric conductivity (see col. 6, line 37 to col. 7, line 15) (see fig. 4), wherein the second laser oscillation section includes III-V compound semiconductor containing any one of arsenic (As), phosphorus (P) and antimony (Sb) as group V element or II-VI compound semiconductor (see fig. 3). Floyd fails to specifically disclose an adhesion layer bonded

between the first and second oscillation. An adhesion layer bonded between a first and second oscillation sections is well taught by Tan (see col. 6, line 5). It would have been obvious to one of ordinary skill in the art at the time the invention was made to place the adhesion layer between the first and second oscillation sections to bond the oscillations section to obtain two different wavelengths, as indicated by Tan (see col. 5, lines 50-61)

With respect to claim 5, Floyd and Tan disclose everything as claimed above. In addition, Floyd discloses the semiconductor substrate (102) is formed by gallium arsenide (GaAs) (see fig. 1).

With respect to claim 6, Floyd and Tan disclose everything as claimed above. In addition, Floyd discloses the first laser oscillation section (200) includes compound semiconductor containing arsenic (As) (see col. 4, line 52).

With respect to claims 15 and 21, Floyd discloses a method of manufacturing a semiconductor laser device capable of emitting a plurality of laser beams having different wavelengths, said method comprising the steps of:
forming a plurality of semiconductor films on a first semiconductor substrate (202) to form a first laser oscillation section (200) (see figures 3 and 4), while at the same time having an electric conductivity on the first laser oscillation section having multilayer structure formed by the plurality of semiconductor films (see col. 6, line 37 to col. 7, line 15), thereby forming first intermediate body (see fig. 4) ; forming an etching stop layer

(142) on a second semiconductor substrate (302) (see fig. 3), while at the same time forming a plurality of semiconductor films on the etching stop layer to form a second laser oscillation section (140) (see figures 3 and 4), having an electric conductivity on the second laser oscillation section (140) having multilayer structure formed by the plurality of semiconductor films, thereby forming a second intermediate body (see col. 6, line 37 to col. 7, line 15); performing an etching treatment on the third intermediate body to remove the second semiconductor substrate portion from the third intermediate body(see col. 5, lines 48-51), and to remove portions of the second laser oscillation section except portions in which waveguide is formed (see col. 5, lines 56-58), thereby forming a plurality of second laser and oscillation sections (see fig. 4); removing remaining portions of the etching stop layer (see col. 5, lines 53-54), followed by cleaving the third intermediate body and dividing the third intermediate body along recess portions formed on both sides of each of the second laser oscillation sections (see col. 7, lines 39-40) (se fig. 4) thereby forming plurality of semiconductor laser devices each including a first laser oscillation section and a second laser oscillation section which are secured together (see fig. 4). Floyd fails to specifically disclose an adhesion layer bonded between the first and second and a second adhesion layer between the second and the third oscillation. Having an adhesive layer between two oscillation sections is well taught by Tan (see col. 6, line 5). It would have been obvious to one of ordinary skill in the art at the time the invention was made to place the adhesion layer between the two oscillation sections to bond the oscillations section to obtain different wavelengths, as indicated by Tan (see col. 5, lines 50-61).

With respect to claim 16, Floyd and Tan disclose everything as claimed above. In addition, Floyd discloses the first laser oscillation section (200) is formed forming semiconductor films containing least nitrogen (N) (see fig. 3).

With respect to claim 17, Floyd and Tan disclose everything as claimed above. In addition, Floyd discloses the second laser oscillation section (140) is formed forming semiconductor films including an active layer consisting a semiconductor film containing at least phosphorus (P) (see fig. 3).

With respect to claim 18, Floyd and Tan disclose everything as claimed above. In addition, Floyd discloses wherein the second laser oscillation section is formed by forming semiconductor films including an active layer consisting of a semiconductor film containing at least arsenic (As) (see fig. 3).

Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Floyd (US pat. 6,282,220) in view of Tan et al (US pat. 6,252,89 and further in view of Sassa et al. (US pat. 5,650,641).

With respect to claim 2, Floyd and Tan disclose a device with a plurality of laser beams having different wavelengths comprising. Additionally, Floyd discloses an electrically conductive layer (222) on an exposed portion of the first laser oscillation section (200) (see figures 3 and 4), which has been formed due to specific area difference between the first and second laser oscillation sections (200 and 140) and can be viewed from the second laser oscillation section side (140) (see figures 3 and 4). Floyd fails to specifically disclose an adhesion layer bonded between the first and second oscillation. An adhesion layer bonded between a first and second oscillation sections is well taught by Tan (see col. 6, line 5). It would have been obvious to one of ordinary skill in the art at the time the invention was made to place the adhesion layer between the first and second oscillation sections to bond the oscillations section to obtain two different wavelengths, as indicated by Tan (see col. 5, lines 50-61). Floyd also fails to disclose a connected and exposed surface portion of the electrically conductive layer serves as an electric current supply section for supplying a driving current to drive the first and second laser oscillation sections. A connected and exposed surface portion of the electrically conductive layer serves as an electric current supply section for supplying a driving current to drive the first and second laser oscillation sections is well taught by Sassa (see col. 8, lines 41-45) (see fig. 110). It would have been obvious to one of ordinary skill in the art at the time the invention was made to include the surface portion of the electrically conductive layer that serves as an electric current supply section for supplying a driving current to drive the first and second laser oscillation sections, simply, to supply power to the device for the emittion of light, as

indicating by Sassa (see col. 8, line 45).

Claims 3, 4, 7-9, 11, and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Floyd (US pat. 6,282,220) in view of Tan et al (US pat. 6,252,896) and further in view of Hatakoshi (US pat. 6,031,858).

With respect to claim 3, Floyd and Tan discloses a laser device with a plurality of laser beams having different wavelength on a substrate without specifically disclosing that the substrate is formed by group-III nitride semiconductor containing at least nitrogen (N), or formed by silicon carbide (SiC). The substrate formed by group-III nitride semiconductor containing at least nitrogen (N), or formed by silicon carbide (SiC) is well taught by Hatakoshi (see fig. 43). It would have been obvious to one of ordinary skill in the art at the time the invention was made to include a silicon carbide substrate because a conductive n-type SiC substrate allow current to flow in both direction, upward or downward, and thereby mounting or the like is easy to be performed and thermal resistance to a heat flow is also reduced, as indicated by Hatakoshi (see col. 21, lines 21-25).

With respect to claim 4, Floyd, Tan, and Hatakoshi disclose everything as claimed. In addition, Floyd discloses the first laser oscillation section includes a semiconductor containing at least nitrogen (N) (see fig. 4).

With respect to claims 7-9, Floyd and Hatakoshi disclose everything as claimed. In addition, Floyd discloses the second laser oscillation section as a semiconductor laser including a semiconductor containing at least phosphorus (P) and arsenic (As) in its active layer (see figure 4). Floyd also discloses wherein the first laser oscillation section is a semiconductor laser including a semiconductor containing at least arsenic (As) in its active layer (col. 4, line 52) while the second laser oscillation section is a semiconductor laser including a semiconductor containing at least phosphorus (P) (see figure 4). Floyd fail to specifically disclose the active layers for emitting a light having a wavelength 650 and 780 nm. However, the active layers for emitting a light having a wavelength 650 and 780 nm for a multiple oscillation laser is well taught by Tan (col. 6, lines 37-40). It would have been obvious to one of ordinary skill in the art at the time the invention was made to fabricate a multiple wavelength to enable the device to generate light having a specified peak wavelength from a selection of wavelengths. As indicated by Tan (see col. 5, lines 8-21), one advantage is that since the short-wavelength light does not have to propagate through a substrate to reach the long-wavelength, much of the short-wavelength light propagating in a direction toward the long-wavelength will reach the long-wavelength. Therefore, the light-generating efficiency of the long-wavelength laser is not reduced.

With respect to claims 11 and 12, Floyd, and Hatakoshi disclose everything as claimed. In addition, Floyd further discloses a third layer oscillation section having a smaller specific area than said exposed portion (see fig. 4), including a semiconductor

containing at least arsenic (As) in its active layer (see fig. 3), Floyd fails to specifically disclose the active layer for emitting a light having a wavelength of 780 nm and an adhesion layer between two oscillation secton. However, the active layer for emitting a light having a wavelength of 780 nm for a multiple oscillation laser is well taught by Tan (col. 6, lines 37-40). It would have been obvious to one of ordinary skill in the art at the time the invention was made to fabricate this multiple wavelength device because this type of fabrication allows the short-wavelength light not to propagate through a substrate to reach the long-wavelength. Much of the short-wavelength light propagating in a direction toward the long-wavelength will reach the long-wavelength. Therefore, the light-generating efficiency of the long-wavelength laser is not reduced, as indicated by Tan (see col. 5, lines 15-20). Floyd also fails to specifically disclose an adhesion layer bonded between the first and second and a second adhesion layer between the second and the third oscillation. Having an adhesive layer between two oscillation sections is well taught by Tan (see col. 6, line 5). It would have been obvious to one of ordinary skill in the art at the time the invention was made to place the adhesion layer between the two oscillation sections to bond the oscillations section to obtain different wavelengths, as indicated by Tan (see col. 5, lines 50-61).

Claim 13 is rejected under 35 U.S.C. 102(b) as being unpatentable by Floyd (US pat. 6,282,220) in view Tan et al (US pat. 6,252,896) in further in view of Kovats et al. (US pat. 4,399,541).

With respect to claim 13, Floyd and Tan disclose everything as claimed above. Additionally, Floyd discloses a second support substrate (102). Floyd fails to specifically disclose the supporting substrate having a high thermal conductivity and an electric insulation. The supporting substrate having a high thermal conductivity and an electric insulation is well taught by Kovats (see col. 2, lines 35-53). It would have been obvious to one of ordinary skill in the art at the time the invention was made to include this substrate to provide structural support during the deposition of the red laser, as indicated by Floyd (see col. 5, lines 48- 49)

Claims 14, 22, and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Floyd (US pat. 6,282,220) in view of Tan et al (6,252,896), Hatakoshi et al. (US pat. 6,031,858), and further in view of Onishi (US pat. 6,661,824).

With respect to claims 14, 22, and 23, Floyd, Hatakoshi, and Tan disclose everything as claimed above with an isolation support substrate without specifically disclosing that the support substrate have a high thermal conductivity and an electric insulation to provided electrical current between two oscillation sections. However, a support substrate having a high thermal conductivity and an electric insulation is provided on the side of two oscillation sections is well taught by Onishi (col. 18, lines 30-35) (see fig. 14B). It would have been obvious to one of ordinary skill in the art at the time the invention was made to include the electrical support substrate to provide electricity to other members of the device, as indicate by Onishi (see col. 18, lines 33-

35).

Claims 10 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Floyd (US pat. 6,282,220) in view of Tan et al (6,252,896) and further in view of Onishi (US pat. 6,661,824).

With respect to claims 10 and 19, Floyd and Tan disclose a laser device with a plurality of laser beams having different wavelength on a substrate without specifically disclosing wherein the first laser oscillation section is a semiconductor laser including a semiconductor containing at least phosphorus (P) in its active layer, while the second laser oscillation section is formed by forming semiconductor films including an active layer consisting of a semiconductor film containing at least arsenic (As) and for emitting a light having a wavelength 650 nm, while the second laser oscillation section is a semiconductor laser including a semiconductor containing at least arsenic (As) in its active layer and for emitting a light having a wavelength of 780 nm. All of the above is well taught by Onishi (col. 4, lines 33-40). As indicated by Tan (see col. 5, lines 8-21), it would have been obvious to one of ordinary skill in the art at the time the invention was made to include phosphorus (P) in its first active layer and arsenic (As) in its second active layer while including a wavelength 650 nm and a wavelength of 780 nm because these chemical compounds promote current and wavelength stability while this type of fabrication allows the short-wavelength light not to propagate through a substrate to reach the long-wavelength, much of the short-wavelength light propagating in a direction toward the long-wavelength will reach the long-wavelength. Therefore, the light-generating efficiency of the long-wavelength laser is not reduced.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Forrest et al. (US pub. 2003/0213967) discloses a multicolor organic light emitting device employs vertically. Forrest fails to disclose a side electrical support substrate.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ernest Unelus whose telephone number is 571-272-8596. The examiner can normally be reached on 9:00am to 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Minsun Harvey can be reached on 571-272-1835. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

*E.U*

MINSUN OH HARVEY
PRIMARY EXAMINER